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ALPHA & OMEGA SEMICONDUCTOR, INC.
ALPHA & OMEGA SEMICONDUCTOR, LTD.

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SAN FRANCISCO DIVISION

ALPHA & OMEGA SEMICONDUCTOR, INC., a California corporation; and ALPHA & OMEGA SEMICONDUCTOR, LTD., a Bermuda corporation,

Plaintiffs,

v.

FAIRCHILD SEMICONDUCTOR CORP., a Delaware corporation,

Defendant.

AND RELATED COUNTERCLAIMS

Case No. 07-2638 JSW (EDL)
(Consolidated with Case No. 07-2664 JSW)

DECLARATION OF FRANCOIS HEBERT IN SUPPORT OF PLAINTIFF'S REPLY IN SUPPORT OF ITS MOTION TO STRIKE FAIRCHILD'S PATENT L.R. 3-1 DISCLOSURES

Date: November 27, 2007
Time: 9:00 a.m.
Location: Courtroom E, 15th Floor
Judge: Hon. Elizabeth D. Laporte

I, François Hébert, declare as follows:

1. I am the Chief Technology Officer for Alpha & Omega Semiconductor, Inc.

2. My educational background includes a Bachelor's degree in Electrical Engineering in 1984 from the University of Waterloo, a Master's degree in Electrical Engineering in 1985 from the University of Waterloo and a Ph.D in Electrical Engineering from the University of Waterloo in 1988.

3. I have worked in the semiconductor industry for more than 20 years. I have worked in the power MOSFET industry for more than 12 years, and I have extensive knowledge regarding the structure, design, simulation, manufacturing, characterization and performance of these devices.

4. I have reviewed Fairchild Corporation's Opposition to Plaintiff's Motion to Strike Fairchild's Patent Local Rule 3-1 Disclosure, as well as the Declaration of Dr. Richard Blanchard in support of that opposition. I may refer to those documents herein as "Fairchild Opposition" and "Blanchard Declaration."

5. I disagree with a number of statements in the Blanchard Declaration. For example, I disagree with his statement and suggestions that all of AOS's accused power MOSFET products are manufactured using processes that are the same in all respects relevant to Fairchild's asserted patents.

6. In fact, there are numerous differences among AOS's MOSFET devices. For example, different AOS MOSFET products have different turn-on (threshold) voltages, different gate voltage ratings (maximum Vgs voltage which can be applied for safe operation), different drain voltage ratings (maximum Vds voltage which can be applied for safe operation), different maximum drain current ratings, different drain to source resistance, different transconductance, different drain to source breakdown voltages (BVdss), different capacitances (input capacitance Ciss, output capacitance Coss and gate-drain capacitance Crss), different gate resistance (Rg), different optimum operating frequencies.

7. Many of these characteristics relate to the operating performance of the products,

including, for example, the resistance of the device to breakdown.

8. To achieve the different performance characteristics described above, AOS's MOSFET devices have different features, such as different silicon substrates (n type, p type, and different doping concentrations), different drain drift regions, different doping concentrations in certain regions, carrier type (n or p) and thickness, different trench depth, different trench width, different distances between the trenches, different active cell geometries (striped, closed-cell for example), different depths of the various doping profiles (sometimes referred to as wells), and different number of steps used to fabricate the devices. While not all of the features are different between every product, the there are certainly some differences between the products.

9. Power MOSFETs are configured and optimized for different applications. AOS's catalog (see aosmd.com website for example), shows that the applications include for example: low-frequency DC-DC power conversion, high-frequency DC-DC power conversion, switch-mode-power-supplies (SMPS), SMPS low-side MOSFET, SMPS high-side MOSFET, low-frequency load-switching applications, battery protection applications, AC-DC power conversion, inverters, motor control, general purpose. Some applications even include multiple MOSFETs in one package, or one MOSFET with one passive device such as a diode. An example showing multiple applications of AOS MOSFETs can be found below (from the AOS website, aosmd.com):

ALPHA & OMEGA SEMICONDUCTOR

MOSFET Selector Guide - All Products

	Part Number	Status	Replacement Part	Package	Configuration	Popular Application	Type	ESD Diode	Schottky Diode	Schottky Type	V_{DS} (V)	V_{GS} (±V)	I_D (A) 25°	I_D (A) 70°	P_D (W) 25°	P_D (W) 70°	$R_{DS(ON)}$ (mΩ) 10	$R_{DS(ON)}$ (mΩ) 4.5
309	AOD496	New		TO-252	Single	SMPS	N	No	No		30	20	62	44	62.5	31	9.5	18
310	AOD603	Full Production		TO-252-5L	Complementary	inverter	N	No	No		60	20	12	12	2	1.3	60	85
311	AOD603	Full Production		TO-252-5L	Complementary	inverter	P	No	No		-60	20	-12	-10	2.5	1.6	115	150
312	AOD604	Full Production		TO-252-5L	Complementary	inverter	N	No	No		40	20	8	8	2	1.3	33	47
313	AOD604	Full Production		TO-252-5L	Complementary	inverter	P	No	No		-40	20	-8	-8	2.5	1.6	50	70
314	AOD606	New		TO-252-4L	Complementary	inverter	N	No	No		40	20	8	8	4.2	2.7	33	47
315	AOD606	New		TO-252-4L	Complementary	inverter	P	No	No		-40	20	-8	-8	5	3.2	50	70
316	AOD607	New		TO-252-4L	Complementary	inverter	N	No	No		30	20	12		2.1	1.3	25	34
317	AOD607	New		TO-252-4L	Complementary	inverter	P	No	No		-30	20	-12		2.1	1.3	37	62
318	AOD608	Full Production		TO-252-4L	Complementary	inverter	N	Yes	No		40	20	10	10	2	1.3	39	50
319	AOD608	Full Production		TO-252-4L	Complementary	inverter	P	Yes	No		-40	20	-10	-10	2.5	1.6	51	75
320	AOI452	New		TO-251A	Single	General Purpose	N	No	No		25	20	55		50		8.7	14.7
321	AOI472	New		TO-251A	Single	General Purpose	N	No	No		25	20	50		50		5	9.5
322	AOL1401	New		Ultra SO8	Single	Battery Protection	P	Yes	No		-38	25	-19	-15	5	3	10	
323	AOL1408	Not for new designs	AOL1700	Ultra SO8	Single	SMPS Low Side	N	No	No		30	20	27	22	5	3	4	6
324	AOL1412	New		Ultra SO8	Single	SMPS Low Side	N	No	Yes	SRFET	30	12	27	21	5	3	3.9	4.6
325	AOL1413	New		Ultra SO8	Single	Load Switch	P	Yes	No		-30	25	-14	-11	5	3.2	17	
326	AOL1414	Full Production		Ultra SO8	Single	SMPS High Side	N	No	No		30	12	21	17	5	3	6.5	7.5
327	AOL1416	Full Production		Ultra SO8	Single	SMPS High Side	N	No	No		30	20	21	17	5	3	6.5	10.5
328	AOL1420	Not for new designs	AOL1700	Ultra SO8	Single	SMPS Low Side	N	No	No		30	20	29	23	5	3	3.7	5.5
329	AOL1424	New		Ultra SO8	Single	SMPS	N	Yes	No		30	20	24	19	5	3	5.4	8
330	AOL1426	New		Ultra SO8	Single	SMPS High Side	N	No	No		30	12	15	12	4	2.6	10.5	13.5
331	AOL1428	New		Ultra SO8	Single	SMPS High Side	N	No	No		30	20	18	14	5	3	9.5	16
332	AOL1432	New		Ultra SO8	Single	SMPS High Side	N	No	No		25	20	21	17	6	4	8.5	14
333	AOL1436	Not for new designs	AOL1428	Ultra SO8	Single	SMPS Low Side	N	No	No		25	30	20	16	5	3	11.5	
334	AOL1440	New		Ultra SO8	Single	SMPS Low Side	N	No	No		25	30	25	20	5	3	6.2	
335	AOL1444	Not for new designs	AOL1700	Ultra SO8	Single	SMPS Low Side	N	No	No		30	20	26	21	5	3	4.3	6.3
336	AOL1446	Not for new designs	AOL1418	Ultra SO8	Single	SMPS High Side	N	No	No		30	20	21	16	5	3	7	11
337	AOL1454	New		Ultra SO8	Single	inverter	N	Yes	No		40	20	17	13	5	3.2	9	13
338	AOL1700	New		Ultra SO8	Single	SMPS Low Side	N	No	Yes	SRFET	30	20	26	21	5	3.2	4.2	6
339	AOL1702	New		Ultra SO8	Single	SMPS Low Side	N	No	Yes	SRFET	30	12	21	17	5	3.2	5.8	7.2
340	AOL1704	New		Ultra SO8	Single	SMPS Low Side	N	No	Yes	SRFET	30	12	18	14	4.3	2.8	7.8	9.8
341	AOL1708	New		Ultra SO8	Single	SMPS Low Side	N	No	Yes	SRFET	30	20	21	16.5	5	3.2	6.2	9.5
342	AON3402	New		DFN 3x3	Single	General Purpose	N	Yes	No		20	12	12	9.6	3	1.9	13	17
343	AON3406	New		DFN 3x3	Single	General Purpose	N	Yes	No		30	30	10	7.8	3	1.9	15	24

10. Specific differences between transistors configured for different applications include, without limitation, the following examples: Devices which are switched often and under severe conditions (SMPS, DC-DC converters, etc…) require different characteristics than devices which are rarely switched. Motor-control devices (devices used in hand held battery powered tools for example), must be able to survive much harsher conditions than MOSFETs used to protect batteries of notebook computers and as a result, special techniques to clamp the breakdown voltage and protect the active cells of Power Tool MOSFETs are integrated in the structure.

11. In addition to differences between among the 14 products for which Fairchild provided analysis, there are also difference between those 14 products and the other 342 products that Fairchild accuses of infringement.

12. For example, many of the 342 products have performance characteristics not reflected among any of the 14 products. As one example, the highest R_{DS} among the 14 specifically identified products is 52 mΩ (AOD6405), while R_{DS} of the 342 products AOS products (at V_{GS}=10V) ranges from 3.5 mΩ (AOD438) to 1600 mΩ (AO5800E).

13. Similarly, while the 14 products for which Fairchild provided analysis all have the same drain-source voltage of 30V, the drain-source voltage of the other members in the product family ranges from 12V (AO4437) to 20V (AO6702), 30V (AO6800), 40V (AO4617), 60V (AO4612), 75V (AO4850); AOD464 (105V), AOT404 (105V), and AOD450 (200V).

14. These differences among drain-source voltages of the AOS products are driven by the technical features of those products. For example, the V_{DS} as well as the R_{DS} (when normalized to the area of the device) are impacted by (among other things) the relative depths of a MOSFET transistor's trenches and wells.

15. In short, there are certainly differences among the 14 products for which Fairchild has provided reverse-engineering analyses, as well as differences between those products and the other products listed on the AOS selection guide. Some devices for example, have a well which is shallower than the gate trenches, while other devices haves wells which are deeper than the gate trenches.

16. Finally, it is my understanding that at least some of these differences between the AOS products would be shown by additional reverse engineering, such as Scanning Electron Microscopy (SEMs), or Scanning Capacitance Microscopy (SCMs), or Secondary Ion Mass Spectroscopy (SIMS). Among other things, such analysis would indicate the relative depths of the trenches and wells in the products.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct to my personal knowledge.

Executed this 13th day of November, 2007, at Sunnyale, California.

By François Hébert

François Hébert